

## **SUPPLEMENT FOR THE FINAL TECHNICAL REPORT**

### **For**

**Project Title: The Impact of Climate Change on Mangroves Ecosystem in South Asia**

**Reference Number: ARCP2012-04CMY-Salik**

**Activity 5: Final Project Workshop/ National Seminar on Project Results**

**Panel Organized in Annual Sustainable Development Conference “PATHWAYS TO SUSTAINABLE DEVELOPMENT” 09-11 DECEMBER 2014, ISLAMABAD, PAKISTAN**

- Detailed conference agenda programme is available at;  
[www.sdpi.org/contents/files/Detailed%20Agenda\\_SDC%202014\\_17%20Dec%2014.pdf](http://www.sdpi.org/contents/files/Detailed%20Agenda_SDC%202014_17%20Dec%2014.pdf)
- Panel abstracts can be found online at;  
[http://www.sdpi.org/sdc/papers.php?event\\_id=394&panel\\_id=141](http://www.sdpi.org/sdc/papers.php?event_id=394&panel_id=141)

### **Introduction of the SDC:**

The Sustainable Development Policy Institute (SDPI) announced its Seventeenth Sustainable Development Conference (SDC) titled “Pathways to Sustainable Development” held from 9—11 December 2014 in Islamabad, Pakistan.

At the previous Sustainable Development Conference in 2013, scholars, researchers, parliamentarians, practitioners, professionals and experts debated over the missed opportunities and lost chances; of being off track; of not achieving the goals; and not investing in the present to nurture a positive future for the generations to come.

The thrust of the policy recommendation that came out of the SDC in 2013 was that South Asian countries need urgent reforms and a meaningful role by the civil society to look at their own declaration and seek solutions. Stress was made on reciprocity and maturity to resolve all outstanding issues among South Asian neighbors. The region needs political and executive leadership that has a commitment to strategize for peace and human security and raise tangible safeguards for the socio-economy of the region while engaging with the primary stakeholders, the people.

In this Conference, researchers, academicians, scientists, policy makers, legislators and experts from different fields recommended policy interventions, shared best practices, and presented workable solutions to the emerging challenges under the sub-themes of the panels.

### **Session A-3 Concept Note:**

The mangrove ecosystems are the inter-tidal and super-tidal muddy shores found in bays, lagoons and estuaries which are important components of our natural ecosystems. These are dominated by woody halophytes which are highly adapted with continuous water courses, swamp and backwaters. They feed and breed an amazing diversity of economically and ecologically important flora and fauna. Not only are they a source of livelihoods for local communities but also contribute to global climate mitigation efforts through CO<sub>2</sub> sequestration.

In South Asia, mangrove ecosystems are faced with the constant risk of disintegration due to human activities such as clearing of land for agriculture and urban development. However, climate change is another emerging threat to these ecosystems. Increasing temperature, increasing concentration of greenhouse gases (GHGs), change of precipitation patterns, frequency and intensity of tropical storms and most importantly sea level rise, are the main climate change driven threats to mangrove ecosystems. Temperature rise, extreme weather events and changed precipitation patterns will impact water flows of the Indus River, thus impacting not only socio-economy of the country but also riparian, aquatic and deltaic ecosystems that are dependent on flow regimes.

In this context, the panel would attempt to address the following key questions related to impacts and vulnerabilities of mangrove ecosystem and dependent communities by integrating the community's perceptions and experts' opinion along with observed and projected climate change scenarios:

1. What are the likely drivers of sensitivity and exposure and how are they impacting climate change?
2. What is the coping potential of coastal communities in the backdrop of climate change?
3. What should be the key adaptation options for minimizing climate change impacts and vulnerabilities?
4. What should be the likely environmental flows to delta and mangrove ecosystems due to changes in river flows under climate change?
5. Can institutions and current policies play an effective role in the protection of mangroves ecosystem resources?

## **Session A-3: The Impact of Climate Change on Mangrove Ecosystems in South Asia**

### **Panellists**

<sup>1</sup>**Co-Chairs:** Mr. Mahmood Akhtar Cheema, Country Director, International Union for Conservation of Nature (IUCN), Karachi, Pakistan;

Mr. Cherian Mathews, Oxfam GB, Bangkok, Thailand

### **Speakers**

<sup>2</sup>Mr. Kashif Majeed Salik, Sustainable Development Policy Institute, Islamabad, Pakistan

<sup>2</sup>Ms Sadia Ishfaq, Sustainable Development Policy Institute, Islamabad, Pakistan

<sup>2</sup>Mr. Waheed-ul-Zafar, Sustainable Development Policy Institute, Islamabad, Pakistan

<sup>3</sup>Mr. Muhammad Zia-ur-Rahman Hashmi, Senior Scientific Officer, Global Change Impact Studies Centre (GCISC)

**Special Comments:** <sup>4</sup>Mr. Muhammad Ali Shah, Chairman Pakistan Fisher-folk Forum, Karachi, Pakistan

**Report By:** <sup>2</sup>Ms Sadaf Nawaz & Ms Shahida Arif Khan, Sustainable Development Policy Institute, Islamabad, Pakistan

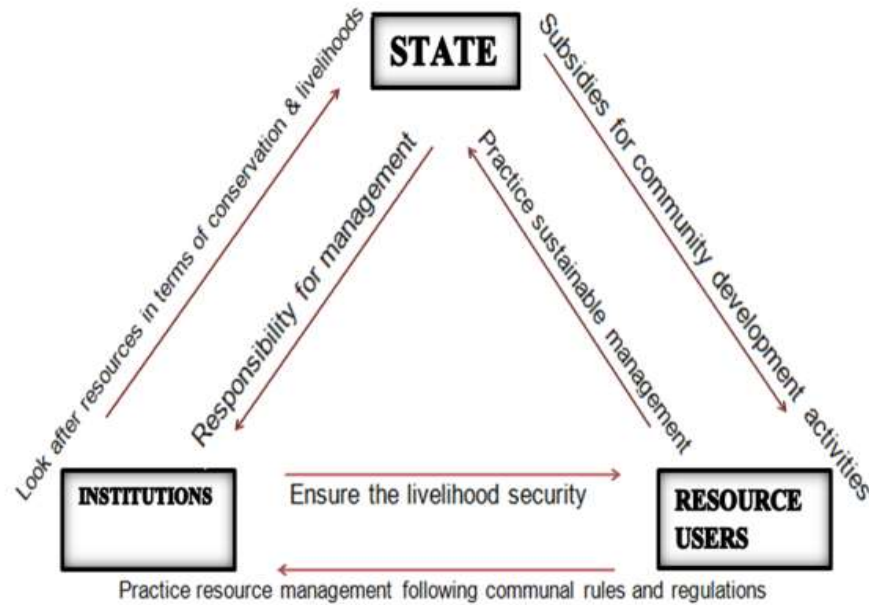
### **Proceedings of the workshop/seminar**

<sup>2</sup>**Mr. Kashif Majeed Salik, Senior Research Associate** presented his study on ‘Socio-economic vulnerability of the mangrove ecosystems to climate change in South Asia: a case study of Indus and Ganges Deltas’. The purpose of his research study was to understand community’s perceptions of the socio-economic vulnerability of mangrove ecosystems to climate change as observed and projected climate change scenarios. The following questions were addressed to explore the answers: *What are the likely drivers of community’s sensitivity to climate change? What are their impacts? What should be the key adaptation options for increasing community’s resilience?* He briefly presented the background of the study. ‘Mangrove Ecosystems’ are very productive source of livelihood. According to a study, one hectare of a well-protected and healthy mangrove ecosystem can produce from 15 Kg of crabs to 400 kg of fish, mollusks, and

shrimp that mature in off-shore areas and about 85,000 metric tonnes of fish (Rs 7.9 billion which is more than 1% of GDP) for export. They are important in protecting land from disasters like cyclones, tsunamis and floods. It was found that the scientific evidence of climate change coincides with perceptions of locals' residents. Vulnerability is defined on the basis of a system's exposure and sensitivity to climate change, moderated by its adaptive capacity. According to Composite Vulnerability Index, it was found that the Indus Delta mangroves ecosystems of Pakistan lie in high vulnerable region i.e. **0.580 CVI**, while Ganges mangrove ecosystem of Bangladesh lies in medium zone i.e. **0.441 CVI** as per research.

<sup>2</sup>**Ms. Sadia Ishfaq, Research Associate** made a presentation on 'Ecological assessment of the Indus Delta: Environmental flows under climate change scenarios'. The Indus Delta Mangrove ecosystem is the world's fifth largest ecosystem. It caters to biodiversity of endemic and indigenous species. About 1.2 million people reside in Keti Bandar and 135,000 people are dependent on it for their livelihood. Environmental flows (E-flows) can be defined as amount of Indus River flows required to sustain healthy ecosystems in Indus Delta. They are dependent upon magnitude, frequency, duration and rate of change. Various methods for assessment of E-flows were identified. In order to define Environmental Management Classes (EMC), various indicators concerning the following questions were explored: *what is the current status of aquatic ecosystems in Indus Delta? What E-flows are required in Indus Delta under the existing ecological conditions? What E-flows will be required under different flow regimes of future climate scenarios, and what will be their impact on Indus Delta?* Indicators assessment was carried out on the basis of literature review and expert interviews. Pakistan lies within class C (50-74) in accordance with EMC, which is a sum of actual indicator scores as a percentage of the maximum possible sum. It was observed that habitats have been disturbed but basic ecosystem functions are still intact. Large changes in natural habitat, biota and basic ecosystem functions have occurred and a clear lower than expected species richness. Under normal circumstances communities are affected by rate of E-flows. If the rate of E-flows increases then community will be benefit otherwise if it decreases, then the communities will get poorer and vulnerable.

<sup>2</sup>**Mr. Waheed-ul- Zafar, Research Assistant** presented his paper on the ‘Institutional analysis for Mangroves at Indus Delta: the case of Keti Bandar, Pakistan’. His presentation analyzed how institutions will be working to compensate communities to bridge their gaps. He discussed the triangular



relationship between ‘state’, ‘institution’ and ‘resource users’. Locals do not destroy their forests or mangrove ecosystem because they know that their coming generations’ livelihood is dependent on it. But there is a mafia which destroys the forest for their own ends. The purpose of the study was to develop necessary framework of adaptation for policy and institutional intervention for mangroves’ sustainability and development for decision-makers at local, national and regional level. A major gap identified was unawareness of property rights among the community.

<sup>3</sup>**Dr. Muhammad Zia ur Rahman Hashmi**, focussed on ‘Spatiotemporal patterns of land cover changes under changing hydrological conditions in the Indus River Delta’. The Indus Delta is considered as one of the world's most threatened large deltas. The mangroves of Pakistan cover the coast line of Pakistan which is 1050 km long (Sindh 350 Km; Baluchistan 700 km). The objective was to find out mangroves’ dependency on fresh water from Indus Delta. The study aimed to assess changes in land cover, especially the all-important mangrove forests of a selected area of the Indus Delta in response to changes in the local hydrological regime (e.g. wet, dry, flood), through comparing land cover status for various hydrologically significant years during period from 1987 to 2011. Hence, it was found that any decrease in rainfall or river flow or both under a future scenario will further aggravate the life of Indus Delta Mangroves and associated ecosystem. Degradation of mangrove forest cover will affect the livelihoods of the local community and make the settlements and ecosystem therein more vulnerable to more frequent and intense extreme hydrological events.

<sup>4</sup>**Mr. Mohammad Ali Shah** stated that “Indus Delta was formed over a period of thousands of years but it took only few years to be destroyed by us.” The mouth of Indus River is its delta and if the river mouth is disturbed, the river does not flourish as river anatomy would get disturbed.

He said there are two main reasons for the destruction of mangrove forests. Firstly, the flow of river Sindh is obstructed and secondly due to land grabbers a.k.a ocean grabbers, which was a new term coined by Mr. Shah. In Karachi, the three main land grabbers are the DHA, Qasim Port and Karachi Port Trust (KPT). Mangroves helped in safeguarding against disaster like tsunamis (such as in 2004). They act as lungs for residents of Karachi and coastal areas by CO<sub>2</sub> sequestration, emphasized the speaker.

<sup>1</sup>**Mr. Mahmood Akhtar Cheema** stressed that the speakers should make effectual use of data analysis through advocacy and outreach. Common efforts are under way such as maintaining E-flows by providing sustainable supply of water for better health of mangrove ecosystem. But in the last seven to eight years, the vegetation cover has raised due to the continuous efforts towards plantation by community and different organizations. Urbanization is also an important aspect to deal with but it should not take place at the cost of environment, Mr. Cheema emphasized.

<sup>1</sup>**Mr. Cherian Mathews** acknowledged the research studies and suggested adaptive measures on how to bring South-to-South learning, and recommended that multi-stakeholder mechanism should be established by the governments. There is a need to follow development approach since implementation is not there. Research studies should be disseminated to public so they can benefit and acquire knowledge. Migration and urban development are two sectors that should be worked upon because the world population is increasing and conserving the mangroves ecosystem should be prioritised, he concluded.

### **Recommendations and Way Forward**

Various adaptation options for increasing community resilience were identified such as;

1. Safe drinking water; enhanced literacy rate and the capacity building should be enhanced for climatic preparedness and innovation.
2. Make sure about the water regulations from dams and barrages to downstream as per the recommendations of water accord 1992.
3. Multi-stakeholder mechanism should be established by the governments to follow development approach, since implementation is not there.
4. An integrated inter-institutional committee/board should be set up for practicable policy implications.
5. Government should take serious legal actions against land grabbers and ocean grabbers.